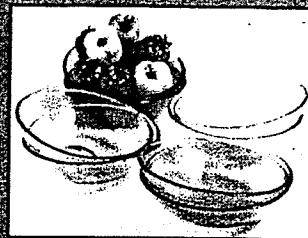


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## CATCHING THE WIND

The World's Fastest-Growing  
**RENEWABLE ENERGY**  
Source is Coming of Age

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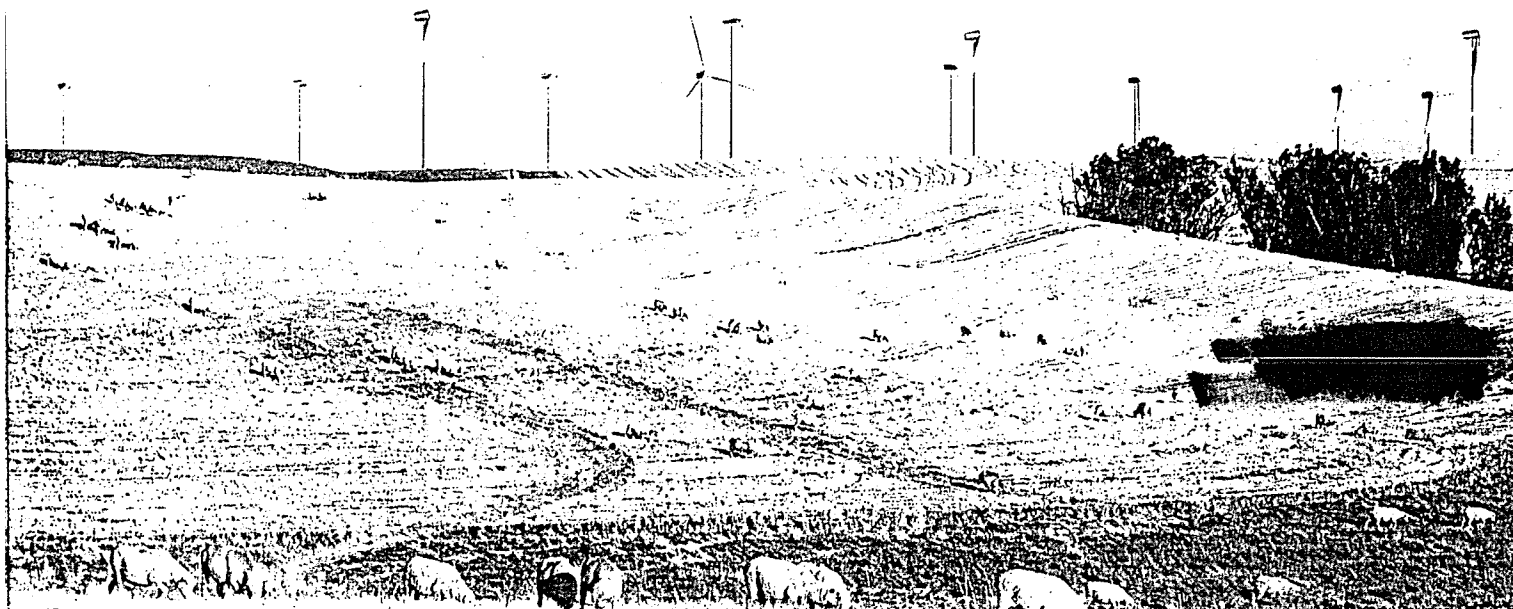
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ANNIVERSARY  
ISSUE

# *Catching the Wind*

*The World's Fastest-Growing Renewable  
Energy Source is Coming of Age*

*By Jim Macoselli*

t the base of the Sagamore Bridge, the gateway to Cape Cod, is a nostalgia-inducing fake windmill that looks like it belongs with tulips and wooden shoes in an image of Holland's colorful past. In fact, it's advertising for a Christmas tree store, but its mere presence is an irony as the Cape is convulsed in an epic battle over some very real wind turbines. Cape Wind plans to build the first offshore wind park in the U.S. in Nantucket Sound, just five miles off the coast of some of the most exclusive real estate in America. If the project is built, it will at least temporarily set a record as the largest wind farm in the world, its 130 turbines producing 420 megawatts of electricity. If it is defeated by a well-funded opposition group with some highly placed political allies, it will be a resounding defeat for wind power in the U.S., but possibly just a minor setback for a worldwide renewable energy movement that is filling its sails with the inexhaustible power of the wind.



## The Growing Power of Wind

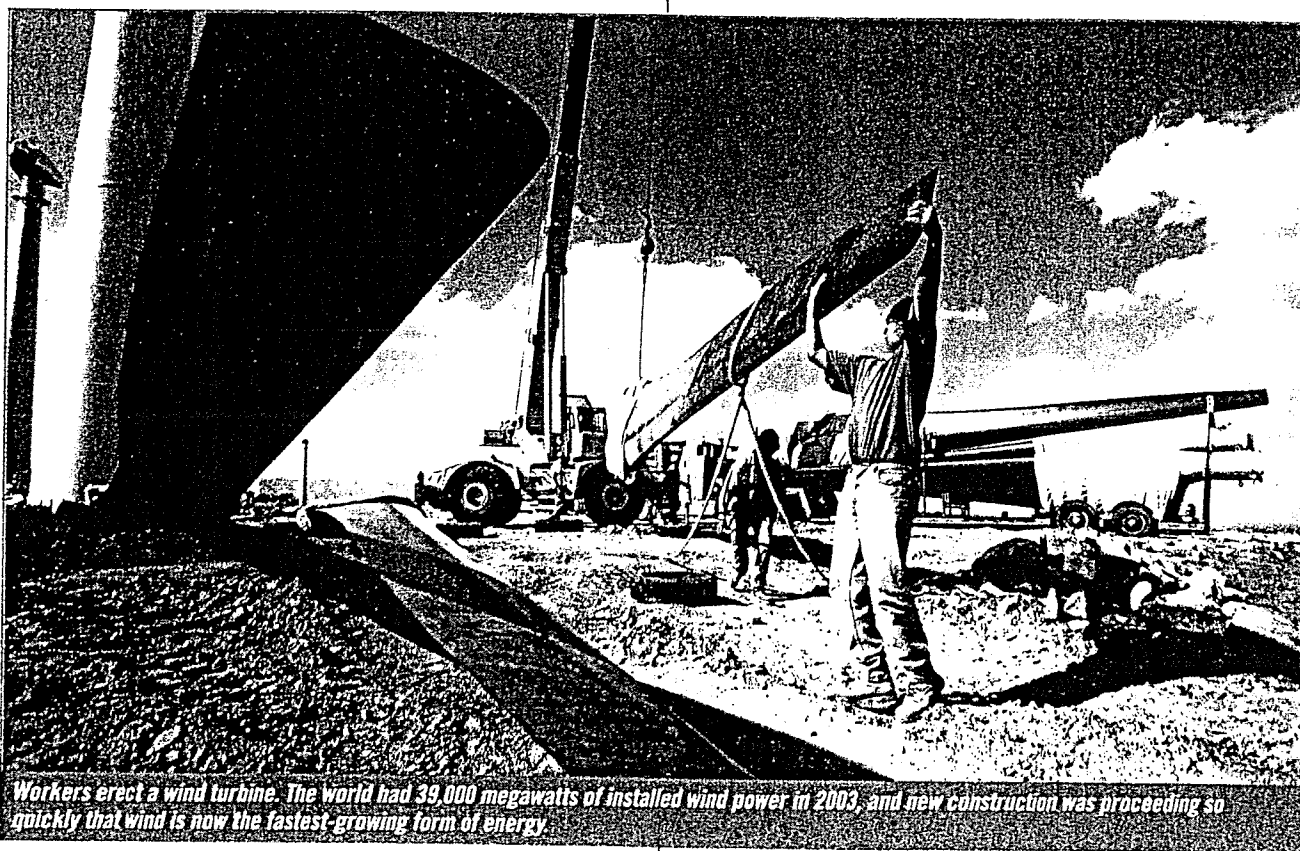
Even as the world experiences ever-more-severe storms and sets new temperature records that are being linked to global warming, we're also setting new records for installed wind energy. The two phenomena might appear to be unrelated, but actually they're closely tied together. Wind energy is zero-emissions energy, a renewable resource that is one of our last, best hopes for staving off devastating climate change. Wind energy has grown 28 percent annually over the last five years, and the so-called "installed capacity" (the generating power of working wind turbines) doubles every three years: It is the fastest-growing energy source in the world. Some 6,000 megawatts of wind capacity—enough to power 1.5 million homes—are added annually.

The old-fashioned windmills that once pumped water

## Fascinating History

Wind technology has increased steadily since the first windmills for pumping water and grinding grain were developed in ancient Persia around 500 to 900 A.D. (see companion story). More than six million small windmills were installed in the U.S. between 1850 and 1970. They were small units producing the equivalent of one horsepower or less and their primary duties were supplying water for animals and human needs. Rural electrification in the 1930s made most of them obsolete, but many remained in place to serve as evocative backgrounds in Hollywood westerns.

Poul La Cour, a Danish inventor, built a practical four blade windmill in 1891, and by 1917 windmills producing 2 kilowatts were in common use in Denmark (still a wind energy pioneer today). The first utility-scale wind generator wa



*Workers erect a wind turbine. The world had 39,000 megawatts of installed wind power in 2003, and new construction was proceeding so quickly that wind is now the fastest-growing form of energy.*

for local farmers have been replaced with high-technology, high-efficiency industrial-grade turbines. The General Electric turbines scheduled to be installed by Cape Wind (resulting from GE's purchase of Enron's wind assets at fire-sale prices) offer a whopping 3.6 megawatts each, are 40 stories tall on thin towers, and boast three prop-like blades the length of two jumbo jets.

As *Business 2.0* reports, "Since 1985, the electric generating capacity of a typical windmill has gone from about 100 kilowatts of constant power to 1.5 megawatts, with a corresponding reduction in cost from 12 cents per kilowatt-hour to less than five cents." Because of federal tax credits (recently renewed until the end of 2005), the real cost of wind power is getting close to such perennials as nuclear, coal and natural gas, which explains the interest of big profit-oriented companies like GE. In 2001, 6,500 megawatts of new wind-generating capacity were installed worldwide, and by 2003 the world had 39,000 megawatts of installed wind power.

the 100-kilowatt Balaclava windmill, built on the shores of the Caspian Sea in 1931. Experimentation on large wind machines continued in the U.S., France, Germany, Great Britain and Denmark.

The U.S. government developed a newfound interest in wind power after the oil embargoes of the 1970s left the country feeling vulnerable about energy supplies. The U.S. Federal Wind Energy Program was created at that time, and California became a showplace for large-scale wind farms. Some 17,000 machines of 20 to 350 kilowatts (producing 1,700 megawatts in total) were installed between 1981 and 1990. A 15 percent federal energy credit helped, as did a 50 percent California energy credit (both were gone by the mid-1980s).

Unfortunately, many of the California windmills suffered from insufficient development time and operating difficulties, including the well-known Transpower wind farm in the Tehachapi Mountains. Compounding the difficulties, the tax credits were issued on the basis of "installed generator ca-

capacity" rather than the actual output of the wind turbines.

After many rushed American designs failed to deliver on their promises, the much healthier Danish wind business had captured 50 percent of the U.S. market by 1986. U.S. companies, including U.S. Windpower, Zond Systems (since acquired by Enron, then by General Electric, a powerhouse today), Southwest Wind Power and Bergey Windpower, gradually began a comeback in the 1990s.

### A Bright Future...With Clouds

The U.S. (6,374 megawatts at the end of 2003) and Europe dominate the development and installation of wind power. Large-scale wind farms, both on- and off-shore, can now be found from Denmark to New Zealand. Europe has more than 28,000 installed megawatts of wind power (70 percent of world capacity). World wind leaders include Germany, the U.S., Spain, Denmark and India, each with more than 2,000 megawatts. Germany is in the lead, with 14,609 megawatts installed by the end of 2003. The wind energy industry in Germany employs 35,000 people and supplies 3.5 percent of the nation's electricity. Denmark has the world's highest proportion of electricity generated by wind, more than 20 percent. The Danish Wind Energy Association would like to see that ratcheted up to 35 percent wind power by 2015.

In the U.S. (which gets less than one percent of its energy from wind) the industry rebounded somewhat in the late 1990s. There are now clusters of wind turbines in Texas and Colorado, as well as newly updated sites in California. According to the American Wind Energy Association (AWEA), there are now wind energy products in almost every state west of the Mississippi, and in many Northeastern states. California leads with more than 2,042 megawatts of installed wind energy, followed by Texas, which experienced 500 percent wind growth in 2001 and now has 1,293 megawatts. AWEA explains that one megawatt of wind capacity is enough to supply 240 to 300 average American homes, and California's wind power alone can save the energy equivalent of 4.8 million barrels of oil per year.

AWEA says the U.S. wind industry will install up to 3,000 megawatts of new capacity by 2009. If that proves true, the U.S. will have nearly 10,000 megawatts of wind power, enough to power three million homes. The economics of wind are looking increasingly good. The cost of generating a kilowatt-hour of electricity from wind power has dropped from \$1 in 1978 to five cents in 1998, and is expected to drop even further, to 2.5 cents. Wind turbines themselves have dropped in installed cost to \$800 per kilowatt. Although, according to the *Financial Times*, wind

power is still twice as expensive as generation from a modern oil-fired plant, federal subsidies and tax benefits available in many countries level the playing field.

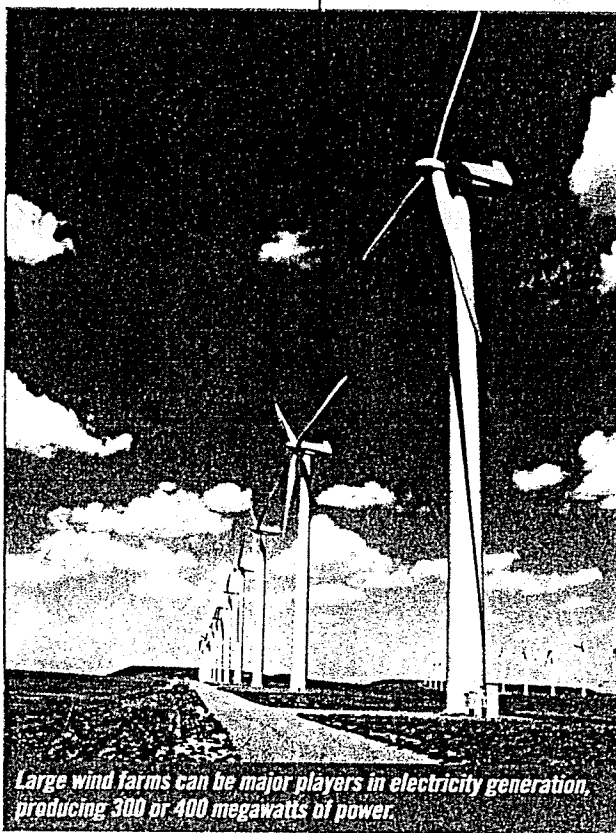
One of the biggest hindrances to even greater wind installation in the U.S. is the on-again, off-again nature of the federal wind energy production tax credit (PTC). Introduced as part of the Energy Policy Act of 1992, PTC granted 1.5 cents per kilowatt-hour (since adjusted for inflation) for the first 10 years of operation to wind plants brought on line before the end of June 1999. A succession of short-term renewals and expirations of PTC led to three boom-and-bust cycles (the most recent a boom in 2003 and a bust in 2004) in wind power installation. Its current extension to the end of 2005 may see some wind projects struggling to meet the PTC requirements before the credit expires once again.

The U.S. could go further, and states with big wind resources would reap major rewards. If Congress were to establish a 20 percent national renewable energy standard by 2020 (requiring utilities to sell a fifth of their energy from sustainable sources), the Union of Concerned Scientists reports, wind-rich North Dakota could gain \$1.4 billion in new investment from wind and other renewables. North Dakota consumers would save \$363 million in lower electricity bills annually if the standard were combined with improvements in energy efficiency. The environment would also benefit with a 28 percent reduction in carbon dioxide emissions from the plains states. A watered-down version of this "renewables portfolio standard" (RPS) was included in the 2002 and 2003 versions of the failed federal energy bill, but failed to make the final cut.

Just such an RPS, on the state level, was enacted when George W. Bush was governor of Texas, and led that state to its pre-eminent status as the number two wind generator in the U.S. Governor George Pataki recently issued an executive order establishing such an RPS for New York State: 20 percent renewables by 2010. New York currently gets 17 percent of its electricity from renewable sources, principally hydro power. The 2004 elections may have been terrible news for the environment, but one bright spot was the passage of a Colorado RPS that will require the state to buy 10 percent of its energy from renewable sources by 2015. Seventeen states have now enacted RPS rules.

AWEA thinks that, with a favorable political climate, the U.S. could have 100,000 megawatts of installed wind power by 2013, with a full potential of 600,000 megawatts. The group points out that wind power could offset a projected three to four billion cubic feet per day natural gas supply shortage in the U.S.

*Continued on page 31*



**Large wind farms can be major players in electricity generation, producing 300 or 400 megawatts of power.**





## WIND: A HARD-BLOWING HISTORY

Some people may think of wind power as a new concept, but in fact humans have been relying on wind for travel and power for nearly 7,000 years. We wouldn't be where we are today (literally!) if not for the energy derived from the wind.

In 5000 B.C., the Egyptians used sails made of bundled reeds to propel their boats up and down the Nile, and later to fan out across the Mediterranean. In 1500 B.C., Asian voyagers used sails made of leaves to power their canoes across the Pacific. For better or worse, wind power enabled European sailing ships to set about conquering distant lands in the 15th and 16th centuries.

As agriculture developed in the Fertile Crescent, particularly the cultivation of wheat and other grains, wind power was used for grinding and irrigation. Some of the first archaeological evidence of wind used for milling grain comes from Persia around 500 to 900 A.D. Arab geographers traveling in Afghanistan in 700 A.D. wrote descriptions of windmills, which resembled our modern revolving doors.

Invading Mongolian armies in the 13th century brought Persian wind technology back to China by kidnapping the Persian windmill builders. European Crusaders invading the same regions also brought home wind technology. Over the

next 500 years, these technologies were adapted and improved—causing an explosion in the use of windmills for irrigation and grinding grain. Windmills were also used to saw timber, grind minerals and oil seeds, process spices and cocoa, grind pigments into paints and dyes, and press tobacco. Wind power enabled the Dutch to drain their lowlands and build a nation that is largely below sea level.

In 1890, the Danes developed the first wind turbines to produce a commercial supply of electricity. Within 20 years, hundreds of wind turbines had popped up around Europe. In the U.S., wind power brought electricity to the Great Plains. Small, isolated farms used wind turbines to charge batteries, run radios and draw water from deep wells. Six million windmills were built across the U.S. between 1850 and 1970.

Self-sufficiency soon gave way to the allure of fossil fuels and the promise of a great big electric grid connecting the entire country. Rural electrification became part of the New Deal. "Once electricity came from the grid, the wind market just died away," says Christine Real de Azua of the American Wind Energy Association.

Fuel shortages in post-World War II Europe stimulated some new innovations—but none could compete in the marketplace with fossil fuels. The 1970s energy crisis, combined with new envi-

ronmental awareness, spurred efforts in the U.S. to go beyond oil, gas and coal and into alternative fuels.

The 1980s subsequently saw a boom in wind energy, with most of the market being developed in California. New experimental technology was developed; some models looked like egg beaters, some had two blades, and others had three.

In addition to federal tax credits, California offered an additional state tax incentive for wind energy production. "In some places in California you could literally drive up to a windfarm, buy a share, and claim an investment tax credit," says Real de Azua.

The 1990s changed that. Oil prices fell dramatically and the political will to support wind power died.

The new generation of windmills is going up on former rangeland, exhausted oil fields, reclaimed coal mines and old farms. Farmers can now get royalties from wind turbines. As wind energy gains momentum, it becomes more sophisticated. Today's windmills are entirely computerized, with sensors that allow them to turn into the wind to harness energy as efficiently as possible. An entire wind farm can be controlled by a single laptop. CONTACT: Illustrated History of Wind Power Development, <http://telosnet.com/wind>. —Jennifer Vogel **E**

Even in the absence of a lucrative production tax credit, wind projects are moving forward. Current projects include construction of the world's third-largest wind farm, with 136 turbines and 204 megawatts capacity, in New Mexico as part of the utility-run New Mexico Wind Energy Center. FPL Energy is also installing 162 megawatts of 1.8-megawatt Danish-made Vestas turbines in Solano County, California for the High Winds project. New England can boast of Green Mountain Power's project in Searsburg, Vermont, which was completed in 1997 and features 11 turbines generating six megawatts.

Other projects are underway in Oklahoma and South Dakota, on the Rosebud Sioux reservation. Tex Hall of the National Congress of American Indians observes that "tribes here [in the Great Plains] have many thousands of megawatts of potential wind power blowing across our reservation lands.... Tribes need access to the federal grid to bring our value-added electricity to market throughout our region and beyond."

### Offshore Wind and Local Opposition

Many of the largest wind farms today are being built offshore, with varying amounts of controversy. Despite its proximity to Jones Beach, one of the largest summer recreational destinations in the New York area (with six million annual visitors), the proposed Long Island Offshore Wind Initiative (with between 25 and 50 turbines, producing up to four megawatts each) has not generated significant opposition, although it could develop as plans move forward. The Long Island wind farm "will be pollution-free, boundless and blow a gust of clean air into the future of energy production," says Ashok Gupta of the Natural Resources Defense Council.

With peak energy demand on Long Island soaring (up 10 percent just between 2001 and 2002), there is clearly a need for new and cleaner sources of electricity. On the western end of the South Shore, the utility-owned wind farm would be two to five miles offshore and provide electricity for 30,000 homes when completed in 2007. Long Island's suffering air would benefit from the annual reduction of 834 tons of sulfur dioxide, 332 tons of nitrogen oxide and 227,000 tons of climate-altering carbon dioxide.

Taken as a whole, Long Island has incredible potential wind resources along its south shore extending past Montauk Point. According to one study, a string of wind farms in that region could produce 5,200 megawatts of power, or enough to meet 77 percent of Long Island's ever-expanding needs.

Germany is a world leader in offshore wind, and recently finalized an agreement to build a 350-megawatt project (with

70 five-megawatt turbines) off the island of Rügen. Britain's Crown Estate, which owns the UK's territorial seabed, has granted approval for 13 offshore wind farms, and British utility Powergen has plans to develop a giant 500-megawatt offshore farm in the Thames estuary near London. The Irish government has approved a 520-megawatt wind farm offshore southeast of Dublin. China is building a 400-megawatt facility 60 miles from Beijing, and says confidently it will be generating 12 percent of its energy from renewables by 2020.

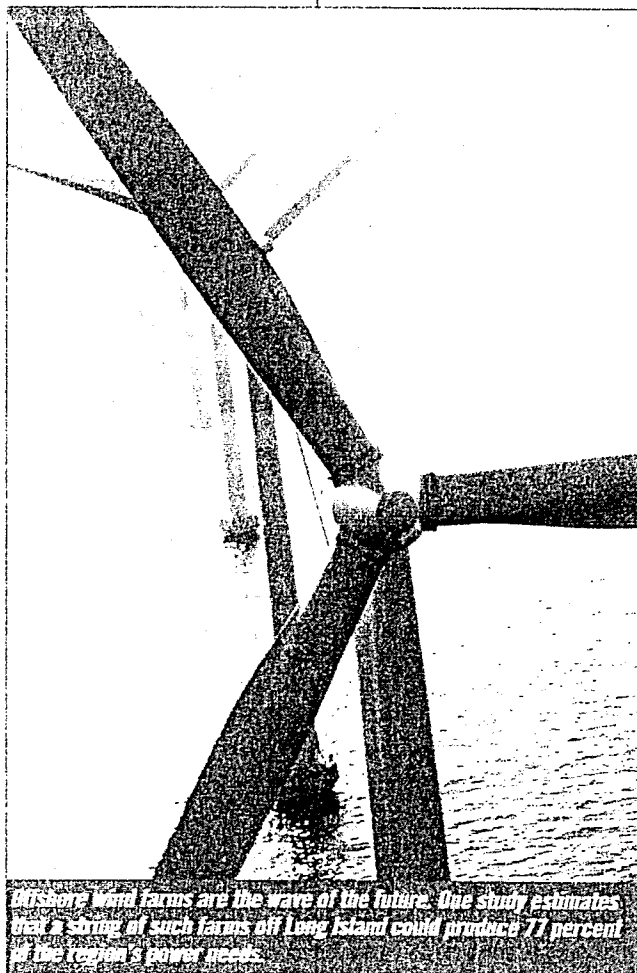
None of these projects have met with the kind of opposition that stalks the Cape Wind project, a planned \$700 million development that would cover 26 square miles off Cape Cod. That wind farm, with General Electric turbines up to 40 stories tall, would surpass Denmark's Horns Reef as the world's largest.

The proposal has split the environmental community, drawing opposition from such powerful environmental allies as Robert Kennedy, Jr. "I'm a strong advocate of wind farms on the oceans and high seas," says Kennedy. "But there are appropriate places for everything. We wouldn't put one of these in Yosemite, and I think environmentalists are falling into a trap if they think the only wilderness areas worth preserving are in the Rocky Mountains or American West. The most important are the ones close to our cities, where the public has access to them. And Nantucket Sound is a wilderness, which people need to experience. I always get nervous when people talk about privatizing the commons. In this case, the benefits of the power extracted from Nantucket Sound are far outweighed by the other values that our communities derive from it."

Writer Bill McKibben, however, argues in *Orion* that the criticisms amount to "small truths." The bigger point is that Nantucket's air contains 370 parts of carbon dioxide, up from 275 parts per million before the Industrial Revolution. "And if we keep burning coal and gas and oil, the scientific consensus is that by the latter part of the century the planet's temperature will have risen five degrees Fahrenheit to a level higher than we've seen for 50 million years." The choice, he writes, "is not between windmills and untouched nature, it's between windmills and the destruction of the planet's biology on a scale we can barely begin to imagine."

### Seething Passions

The Cape seemed deceptively tranquil on a recent visit. Seething passions were just below the surface. The latest attempt to scuttle the project had just been made public: an



Offshore wind farms are the wave of the future. One study estimates that a string of such farms off Long Island could produce 77 percent of the region's power needs.

amendment to the Defense Authorization Act introduced by Senator John Warner (R-VA), which would have required Congressional approval for any offshore wind project in the U.S. If it had been adopted (it was, instead, withdrawn the next day), it would have forced Cape Wind back to the beginning of what had already been a three-year regulatory process.

The permitting process has been a long, hard slog for Cape Wind Associates, which has spent an estimated \$15 million trying to get its offshore farm built. With Warner's amendment lifted (reportedly because of the objections of House Republicans), the next step was the U.S. Army Corps of Engineers' draft Environmental Impact Statement (EIS), a staggering 3,800 pages released November 9. The EIS had been expected in September, but it sat for several months, some say for political reasons, on the desk of one Raymond DuBois, an undersecretary of defense in the Pentagon for military installations and environmental programs.

As had been expected, the draft EIS is largely favorable to Cape Wind. "This report is a big step towards greater energy independence," said a jubilant Jim Gordon, Cape Wind's president. But opponents, led by the Alliance to Protect Nantucket Sound, were subdued. "This is a flawed report, written and paid for largely by Cape Wind," said Alliance Assistant Director Audra Parker.

For the record, Warner's family has property whose view would be affected by the Cape Wind Project. So does Senator

Ted Kennedy (D-MA), whose famous "compound" is in Hyannis, near Ground Zero. Everybody on the Cape has an opinion about the project, though it's not generally expressed with the usual bumper stickers and lawn signs. Instead, there are intense activist groups on both sides of the fence, and public opinion polls that indicate a population that is dramatically split on the project.

The tide has been turning somewhat against the project after a concerted media campaign by the Alliance to Protect Nantucket Sound. The Alliance has some environmental trappings, but its founder, Doug Yearley, is chairperson emeritus of mining giant Phelps Dodge Corporation and a board member of Marathon Oil (a winner of the Toxic Action Center's "Dirty Dozen Award"). To be fair, he's also a member of the World Wildlife Fund's National Council. The Alliance raised \$1.8 million in 2003 through donations from such high-profile Cape residents as Paul Fireman of Reebok, but it spent even more, \$2.4 million, on what the *Boston Herald* called "a small army of hired lawyers, lobbyists and publicists."

Even with the draft EIS released, there will still be a long slog. There will be public hearings, the issuance of a final EIS (expected in mid 2005), more comments, then a permitting decision by the Army Corps. The state has a role also in the form of the Office of Coastal Zone Management. Even if a permit is issued (it can be approved with conditions or denied outright), there's a good chance the Alliance would then file a lawsuit.

## CONVERSATIONS

### Randy Swisher: A Force for Wind



INTERVIEWED BY JIM MOTAVALLI

**R**andy Swisher has been involved in the fight for renewable energy since 1975, when he served as executive director of the Washington, D.C.-based Public Interest Research Group (PIRG). He has also worked for wind as a legislative representative for the American Public Power Association, energy program director for the National Association of Counties

and a House Interior Committee energy and water specialist. Swisher, who holds a Ph.D. from George Washington University, has taught courses in energy policy at Georgetown University, and at its law center. He has been the executive director of the highly visible American Wind Energy Association since 1989.

**E Magazine:** I wanted to ask you about the economics of wind energy. Wind prices seem to be coming down significantly, so how do they compare to conventional sources?

Randy Swisher: Wind competes very well with the cost of generating electricity from a new coal or natural gas power plant. The economics of any one project is going to be different, with the biggest determinant being wind speed. On the west Texas plains, wind is damned cheap. A wind farm in Alabama would be pretty darned high-cost power. It matters where you site a wind farm. According to the Internal Revenue Service, which tracks these things because of the production tax credit, the average cost of wind in 2003 was 3.24 cents per kilowatt-hour. A new coal plant generates electricity somewhere between three and four cents per kilowatt-hour, depending on the technology and the cost of coal.

**How important is the production tax credit for wind power development? It has now gone through three cycles of extension and expiration.**

The credit has been one of the foundation stones for wind project financing in the last decade. When a developer is conceiving a project, all the analysis and potential equity ownership is predicated on the availability of the credit. If you take that away, you go back to square one in terms of the economics. It's a big deal. You can't just price the power a bit higher and move on. It's complicated by the fact that no one really expects the credit to disappear; it's one of the more popular provisions that comes before the Congress. So a wind project developer would be silly to just say, "Oh, we'll just go ahead and develop this project without the credit."

**Why doesn't Congress just re-authorize it for a longer period of time?**

That's the kind of rational, eminently sensible question that comes from people who do not work with Congress on a day-to-day basis.

**Is there strong NIMBY (Not In My Backyard) opposition to wind power?**

There are articulate voices on both sides. "This project in this place is inappropriate for any number of reasons," says the passionately persuasive Audra Parker. "We're supportive of renewable energy, but this is risky technology—the first offshore wind project in the U.S.—and do we really want to turn our priceless Nantucket Sound into a scientific experiment?"

The Alliance raises the specter of Cape Wind as a stalking horse for at least three more large-scale wind farms in Nantucket Sound. It says the five million people who visit the Cape and the islands (Nantucket and Martha's Vineyard) every year will be "confronted by 130 huge towers in the Sound," each 100 feet higher than the famous Bourne and Sagamore bridges. In fliers, the group warns about "a risky new technology and a developer who has never built a wind plant."

Supporters say that Cape Wind can replace 113 million gallons of oil per year, that it will reduce regional greenhouse gas emissions by one million tons per year (the equivalent of taking 162,000 cars off the road) and reduce New England's wholesale electric prices by \$25 million per year. They also say its construction will create 1,000 new jobs.

Bill Eddy, a local Episcopal priest, has been a vocal supporter and founder of the 3,500-member Clean Power Now, which supports the project as strongly as the Alliance opposes it. "The wind farm could contribute 75 percent of our electrical needs and have a noticeable and positive impact on our electricity costs for the life of the project," says the gray-haired

Eddy in a booming, pulpit-friendly voice. He also thinks the wind project will improve Cape Cod's surprisingly bad air quality (it's 50 percent worse than Boston's, Eddy says).

Eddy built his own first wind generator in 1976, to celebrate the national Bicentennial. A wind farm on Nantucket Sound, he says, "represents a compelling vision for our future." He quotes King Solomon from the Bible's Book of Proverbs, "Where there is no vision, the people perish." Eddy feels betrayed by America's national leaders, who talk about the need for energy independence, but then refuse to take a stand in supporting key projects. "Sometimes I think they'd rather see Arlington National Cemetery expanded with a thousand new markers for young men who died fighting to protect our oil supply than to have to endure the sight of wind turbines producing clean energy off Cape Cod," he says.

When *E* visited, the unassuming Mark Rodgers, a spokesperson for Cape Wind, was combative about the well-organized opposition. "The Alliance approach has created a lot of unnecessary fears," he says. "They've dramatically outspent us with incessant fear-mongering." The Alliance's spending has produced results, Rodgers admits. In 2002, 55 percent of Cape residents supported the project, but after two years of Alliance undermining the situation has reversed, and a *Cape Cod Times* poll shows 55 percent oppose the wind farm. (Rodgers points out, however, that the *Times* has vehemently opposed Cape Wind, and that its reporting on the poll failed to

Our sense is that as wind development happens on a wider scale, you are inevitably going to run into more NIMBY opposition, particularly in some regions. We don't see a lot of NIMBY concerns in Texas, Wyoming or the Dakotas. But in other regions, like New England, there is a lot of concern about the landscape and about any development at all. Green Mountain Power in Southern Vermont spent a lot of time working with the community and environmental groups before siting its Searsburg project.

The Cape Wind project in Massachusetts is located in Horseshoe Shoals, which has an excellent wind regime, is not in the path of any shipping lanes, and is in relatively shallow water to keep construction costs down. The number of offshore sites that provide those kinds of advantages is somewhat limited. Jim Gordon [of Cape Wind Associates] went with that site because it made good sense, but he recognized there would be some concern from wealthy land owners. He thinks that, in the end, there really are no environmental issues that are prohibitive at that site. The research supports that conclusion, so it comes down to visual impact. Are you willing to accept the tradeoff of having

that project five miles offshore, barely visible to the naked eye? While there has been a lot of noise about it, visual impact alone is hardly the kind of compelling reason to stop such a project, given all the benefits it brings in terms of environmentally preferable generation of electricity.


**Is offshore wind always going to be more productive than onshore wind?**

Not always. The reason to go offshore is because winds are stronger, but of course the installation costs are higher. Offshore wind is a bit more expensive to develop, but there are some parts of the country, such as New England, where there is some pretty significant opposition to basing wind farms on land. The Cape Wind and Long Island Power Authority projects are attractive because you need to go offshore to build on the scale necessary to obtain optimum economics. Europe is definitely moving towards a concentration on offshore wind, but the situation is somewhat different in the U.S. where you have mile after mile of relatively open land in windy parts of the country.

**Is the industry concentrating on large wind farms rather than smaller cottage projects?**

It's a mix. Sometimes you have a municipal utility with relatively limited demand, and a smaller wind installation makes sense. One of the trends in the upper Midwest is toward farmer-owned or community-owned projects. Those projects tend to be smaller as well.

**Do you think we will ever have the kind of national consensus on wind power that they now have in Denmark, together with a willingness to overcome these "viewshed" objections?**

It is fully my expectation that the U.S. will be the largest market for wind power over the next 20 years. And along with that there will develop exactly the kind of consensus you're describing. The economic, environmental and energy benefits associated with that course of action are so compelling, that a lot of this NIMBYism will not prevail. There will still be conflict over individual project locations. Wind is still pretty new in some parts of the country, and some of the fearful comments are amazingly naïve and ill-informed. As people become more informed, such judgments will lose credibility. CONTACT: American Wind Energy Association, (202)383-2500, [www.awea.org](http://www.awea.org). 



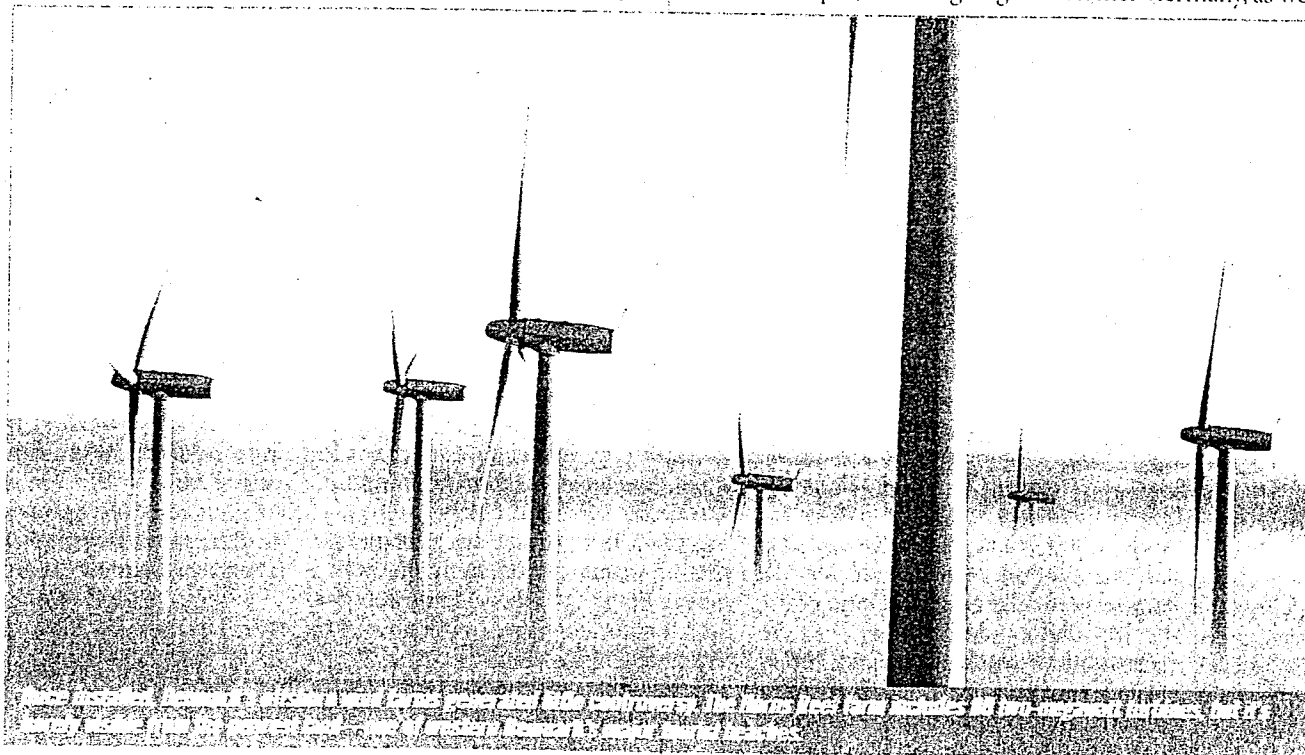
disclose the 20 percent who simply refused to answer the newspaper's question.)

Rodgers says that alarmist wind opponents can point to grandiose proposals by the New York-based Winergy to construct as many as 2,000 turbines off the coasts of New England, Delaware, Maryland and Virginia, ruining the view for millions. "They've gone up and down the coast and announced plans for wind farms everywhere," Rodgers says. "It's easy to send out press releases, but much harder to actually do the hard work of licensing wind farms. Their approach has created a lot of unnecessary concern." Dennis Quaranta, whose experience comes from developing a fish farm in Long Island Sound's Gardner Bay, says that Winergy doesn't plan to operate wind farms, but will bring in management teams after it obtains the necessary permits. But it's unclear if any of the company's projects have moved very far.

Rodgers believes the release of the Cape Wind EIS will pave the way for the wind farm to begin construction in 2007. "The document, put together by the Army Corps with input

neer and inventor Poul la Cour in the 1890s. A Danish engineer, Johannes Juul, was the first to connect a wind turbine with an AC generator to the electrical grid. Denmark-based companies also helped spark the modern wind movement in the 1970s. In 2003, Danish manufacturers had nearly 40 percent of the world turbine market, which grows at the astounding rate of 20 percent per year. Ninety percent of the turbines manufactured in the country go for export. Wind is the third-largest contributor to the Danish economy, after pharmaceuticals and Lego blocks, and provides 20,000 jobs in all of its dimensions. Denmark itself has 3,100 megawatts of installed wind power, but that figure will undoubtedly be outmoded by the time this article goes to press.

Denmark is a small country, with just 5.4 million people, but it is a mighty force in the wind industry. Just one industrial giant, Vestas (which recently merged with its largest competitor, NEG Micon) has 35 percent of the international market and employs 8,500 people. Its turbines are being installed all over Europe (including largest customer Germany, as we



from other agencies, shows that there are compelling public interest benefits from this clean energy project," he says. But a lot of wind will be blown before then. Both supporters and opponents of Cape Wind make comparisons to the Horns Reef wind farm off Denmark's west coast. There are indeed many similarities. The projects are of comparable size (though Cape Wind will be larger), and both are in parts of the country heavily used by recreational visitors. But two years after Denmark's turbines started generating power, the controversy has died down. Despite the Alliance's determined efforts to make Horns Reef appear to be a disaster, it has been woven into the fabric of a nation firmly committed to wind power.

#### Denmark: The Windy Side of the Wind

On a fast train ride across Denmark from east to west, passengers get used to the sight of rows of tall white Vestas wind turbines turning slowly in the ever-present breeze. The Danes pioneered wind energy development dating back to the pio-

neer and inventor Poul la Cour in the 1890s. A Danish engineer, Johannes Juul, was the first to connect a wind turbine with an AC generator to the electrical grid. Denmark-based companies also helped spark the modern wind movement in the 1970s. In 2003, Danish manufacturers had nearly 40 percent of the world turbine market, which grows at the astounding rate of 20 percent per year. Ninety percent of the turbines manufactured in the country go for export. Wind is the third-largest contributor to the Danish economy, after pharmaceuticals and Lego blocks, and provides 20,000 jobs in all of its dimensions. Denmark itself has 3,100 megawatts of installed wind power, but that figure will undoubtedly be outmoded by the time this article goes to press.

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Blavand is a beachside resort town at Denmark's western tip, a summer mecca for hordes of German tourists who rent the colorful thatched-roof summer houses that line the dunes. On a blustery but sunny afternoon in October, they thronged the town's main shopping street and made pilgrimages to the top of its 100-year-old lighthouse. The 120-foot lighthouse, with its 170 worn wooden steps, is a great vantage point for birders who come to see grebes, gannets, skuas and the occasional shearwater or storm petrel on their migratory route through Scandinavia. But it's also the best place to see one of the world's largest offshore wind farms, Horns Reef.

Unfortunately, on cloudy days there's not much to see:

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